University of Nevada, Reno – Engineering Building Project 16-A046
Pre-Construction Virtual Construction Building Information Modeling Memo of Understanding

This document is meant to serve the project team as a means of developing expectations, understanding terminology, and assigning responsibility to the VC/BIM process during the preconstruction phase of the UNR Engineering Building Project. It is not meant to serve as a comprehensive approach or formula. The success of any VC/BIM effort is in developing clear expectations and understanding, balanced with flexibility and the ability to adapt.

The Design Team will utilize VC/BIM Tools in the Spirit of Integrated Product Delivery in order to reduce construction risk, increase productivity and provide an accurate and manageable Facility Management Tool in the form of a "Live" As-Built at the completion the project.

Definition of Virtual Construction / BIM:
VC/BIM is emerging as the way to organize project teams to reduce construction risk at a time when the industry is searching for ways to eliminate waste, cut costs, improve productivity, and create a live AS-Built for delivery to the Owner's Facility Management Team.
VC/BIM integrates the owner, architect, construction manager, engineers, and subcontractors to form a Design Collaborative where the formation of Construction Documents is equally shared by all the team members, thence the Construction Industry's future's paradigm shift to Master Builder.

GOALS FOR SUCCESSFUL VIRTUAL CONSTRUCTION (BIM)

PRE-CONSTRUCTION VC/BIM

1. **VC/BIM Implementation Plan:**
    a. The purpose of the Virtual Construction / BIM Implementation plan is to develop a plan to effectively integrate the VC/BIM process into the project delivery process.
    b. The plan will outline a way for the project team to:
        i. Understand and communicate the strategic goals for implementing VC/BIM
        ii. Understand the roles and responsibilities within each organization involved.
        iii. Design an execution process that is specific to best business practice for each organization.
        iv. Understand the resources and training necessary to implement the plan.
        v. Provide a benchmark for describing the process to future participants who join the project.
        vi. The Owner will be able to define contract language to ensure that all project participants fulfill their obligations.
        vii. Measure progress throughout the project.
    c. Establish a Virtual Construction Implementation Plan at Project Kick-off. The developers of the plan will include the Owner's representatives, Design Professionals, and CMAR. There will be a Virtual Construction Kickoff meeting that establishes goals, point of contact from each team and a Virtual Construction Champion for each team as well.
    d. Modeled Elements:
        i. The implementation plan will thoroughly outline all design elements pertinent to the successful incorporation of VC/BIM
        ii. These elements will include all architectural and basic structural components needed to interpret design intent. All MEP elements with a minimum of 2" diameter will be modeled including insulation. In the event there are areas where pipes smaller than 2" run adjacent to one another, that bank of piping or conduits will be modeled as well. All sloped piping will be modeled. All equipment will be modeled with the clearances needed to access and service them. These "no fly" zones will be modeled and named clearances in Revit so clashes can easily be run to verify these "no fly" zones are clear.

iii. These modeled elements will be modeled to a level 300 by the design professionals and CMAR will run clash detections of these elements. CMAR will take the designed model after preconstruction and work with the subcontractors to model these elements for fabrication and incorporate the constructability details the design model will not represent for installation. This construction model will be further developed by all subcontractors to use for overhead rough-in and coordination.

2. **Constructability Analysis:**
    a. CMAR will begin virtual constructability analysis of the details at the end of the Design Development phase. This analysis will lead to a better understanding of the constructability of the UNR Engineering Building Project. Details where dissimilar materials abut and sequencing of trades needs to be better understood will be modeled for review and acceptance of interpretation of design intent.
    b. CMAR will run a Constructability Clash Report of the Architect's and Engineer's models at each phase of design where budgets are due beginning at the end of the Design Development phase. These reports will be presented 2 weeks from date of receiving all models that are to be included in the clash report. Concurrent with the scheduled deliverable, CMAR will initiate weekly meetings to review the constructability and clash items beginning at the end of the design development phase. The goal of these meetings are to address any items of constructability, represent interpretation of design intent, and use this opportunity during the preconstruction phase to work out any potential conflicts that might occur during construction. This phase is an opportunity for everyone involved in the project to work collaboratively for the common good of the project. With the use of the VC/BIM tools we have available we will be able to resolve the majority of major constructability items before construction begins.

3. **Estimating:**
    a. CMAR will utilize the design model in conjunction with on-screen takeoff and other traditional estimating tools to assist in the development of the budgets at the various design phases when budgets are due.
    b. CMAR will work with the Design Professionals in establishing the level of detail that needs to be placed in the model to be able to benefit from the estimating (5D) portion of VC/BIM. This will be established and published in the Virtual Construction/BIM Implementation Plan for all parties to reference through the preconstruction phase of the project.

4. Fee:

a. The costs for the services listed above are included in CMAR's pre-con preconstruction agreement fee and Design Consultant's agreement to provide professional services fee.

(For Design Team/ Representative)	(for CMAR contractor/Representative)
Date	Date